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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SUCHFIELD, GEORGE A

ART UNIT	PAPER NUMBER
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3672

DATE MAILED: 11/25/2002

15

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/841,194

Applicant(s)

VINEGAR ET AL.

Examiner

George Suchfield

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 September 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2309-2385 and 5150-5171 is/are pending in the application.
- 4a) Of the above claim(s) 2312-2314 and 2351-2353 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2309-2311, 2315-2350, 2354-2385 and 5150-5171 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 2309-2385 and 5150-5171 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 13 March 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 12, 13. 6) ☐ Other:

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1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 5152, 5153, 5154, 5157- 5159 and 5163 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 5152 and 5153 are deemed incomplete and therefore indefinite insofar as there is no step of initially establishing "a pyrolysis zone", as called for in lines 1 and 2 of the claims. This rejection could be overcome, however, by, amending lines 1 and 2 of claim 5152 to read -- wherein a pyrolysis zone is established in the part of the formation --, and amending lines 1 and 2 of claim 5153 to read wherein a pyrolysis zone is established in the part of the formation proximate to and/or surrounding at least one of the heaters -- .

Claims 5157, 5158 and 5163 are similarly indefinite and/or incomplete in failing to initially establish "a pyrolysis zone".

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 2309-2385 and 5150-5171 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2309-2385 of

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compending Application No. 09/841,293. Although the conflicting claims are not identical, they are not patentably distinct from each other because the coal formation treated by the methods of claims 2309, 2348 and 5160 of this pending application are deemed broad enough to encompass or comprise the hydrocarbon formation of claims 2309 and 2348 of the compending application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

5. Claims 2309, 2310, 2311, 2316, 2319, 2321-2331, 2333, 2334, 2342-2344, 2348, 2349, 2350, 2355, 2358, 2360-2370, 2372, 2373, 2181, 2382, 5151-5154, 5156-5163, 5165, 5166, and 5168-5170 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ljungstrom (2,923,535).

Ljungstrom discloses a process for heating a coal formation wherein the heat imparted causes volatilization, pyrolysis and/or gasification of hydrocarbon constituents, which are subsequently produced to the surface as production fluids or "mixture". Such heating process entails electrical heating of a zone of the formation by electrical heating elements (22) disposed in wells (20), as illustrated in Figures 1-5 and 9, followed by in situ combustion. In one embodiment, the process may be operated such that both a first and second heating stage may be carried out during the electrical heating phase, (note col. 4, line 35 – col. 5, line 6; col. 7, line 29 – col. 8, line 14), and which said second stage may effect pyrolysis of the coal formation by heating the coal up to 400oC. It is deemed that the numerous and specific references to "desirable products of oil vaporization and pyrolysis", "valuable products" (col. 2, lines 20-40) in Ljungstrom indicates that a substantial amount of the organic carbon content of the coal is converted into condensable hydrocarbons. Accordingly, it is deemed that the process of

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Ljungstrom (note also the example set forth in col. 4, line 38 – col. 5, line 6) will inherently or obviously effect yield of condensable hydrocarbons of “at least about 15% by weight”, as called for in claims 2309 and 5160 or “greater than about 60% by weight ... as measured by Fischer Assay”, as called for in claims 2348 and 2344 . Moreover, Ljungstrom further indicates that such “desirable products of oil vaporization and pyrolysis” are obtained by controlling, inter alia, the temperature in the formation. Thus, Ljungstrom is deemed to be necessarily or obviously “controlling the heat”, as called for in claims 2309, 2348 and 5160.

As per claims 2310, 2349, in view of the large number of heat input wellbores or “sources” (20), relative to a recovery well (26), as illustrated in Figures 2-5 and 9, it is deemed at least some overlap or “superposition” of the heat applied will necessarily or obviously occur during the first and/or second electrical heating stages, especially during the in situ combustion phase, in order to provide complete heating of the coal formation zone(s) (30)-(32).

As per claims 2311, 2350, 5152, 5153, 5157, 5158, 5163, and 5168, during the second stage of electrical or preheating and subsequent in situ combustion operation in the process of Ljungstrom, the temperature in the coal formation is maintained within a pyrolysis temperature range, e.g., 400oC or 300 – 400oC (note col. 2, lines 40-55).

As per claims 2316, 2355 and 5169, Ljungstrom specifically discloses that the temperature “may be controlled depending on ... the pressure maintained or permitted to build up” (col. 2, lines 41-45). In addition, the temperature and pressure curves of Figures 10 and 11 appear to indicate a direct relationship between temperature and pressure within the formation.

As per claims 2319, 2358, Ljungstrom further effects a conduction heating of the side portions of the formation surrounding such zone(s) (depicted in Figures 2 as the region between

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the outlines (30) and (32); note also col. 3, lines 7-36). Accordingly, it is deemed that such coal formation region between outlines (30) and (32) is clearly heated "substantially by conduction".

Regarding claims 2321-2331, 2333, 2334, 2360-2370, 2372, 2373, and 5170 it is deemed that the myriad hydrocarbon product mixtures recited in these claims, such as a hydrocarbon component "having an API gravity of at least about 25o" would necessarily or obviously occur or be included, overall, in the "desired products of oil vaporization and pyrolysis" obtained in carrying out the heating process of Ljungstrom (col. 2, lines 25-48), with the precise composition of the product fluids seen as dictated by the particular coal formation actually encountered in the field. Moreover, it would be an obvious matter of choice to operate the Ljungstrom process to minimize what would be considered refinery contaminants, such as sulfur, nitrogen and/or oxygen in the product mixtures. Similarly, it would be obvious to reduce or minimize the amount of asphaltenes in the product mixtures for optimum downstream refining. Also, in the event that the particular coal deposit encountered yields ammonia gas, it would be an obvious expedient to utilize it in a commercial process such as fertilizer production.

The heating process of Ljungstrom also causes an increase in permeability of the hydrocarbon formation (note col. 2, lines 1-24). It is further deemed that such permeability increase will inherently or obviously be substantially uniform, as called for in claims 2343, 2382 and 5166, e.g. during an overall field heating process, as illustrated in Figures 2-5. Such permeability increase is deemed to necessarily or inherently encompass an increase to "greater than about 100 millidarcy", as called for in claims 2342 and 2381; alternatively, to increase the permeability to greater than 100 millidarcy would have been an obvious matter of choice in order to ensure adequate fluid flow through the formation.

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As per claims 5154, 5159, 5165, Ljungstrom disposes the heaters within "holes 20", with no apparent requirement that the holes or wellbores be cased or otherwise completed.

6. Claims 2317, 2318, 2320, 2335, 2338, 2344, 2345, 2356, 2357, 5167, 2374, 2377, 2383, 5150, 5155, 5167 and 5171 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535).

The precise heating rate and/or thermal conductivity recited in claims 2317, 2318, 2356, 2357 and 5167 are deemed obvious matters of choice or design, especially in carrying out the embodiment in Ljungstrom of controlling and/or maintaining the temperature in the hydrocarbon formation within a specific operating range (col. 2, lines 25-48).

The thermal conductivity recited in claims 2320 and 2359 is deemed an obvious matter of choice or design based on, e.g., the quality and type of the coal formation present and/or the matrix characteristics of the particular oil shale or coal formation encountered in the field.

The steps of 2335, 2338, 2344, 2374, 2377 and 5171 such as controlling the heat or pressure in the formation, are deemed obvious matters of choice or design in carrying out the process of Ljungstrom, consistent with one of the overall objectives of Ljungstrom to control the heating process (col. 2, lines 25-55).

Regarding claims 2345, 2383, 5150 and 5155, Ljungstrom in the embodiment of Figures 2-5 and 9, discloses that myriad heating wellbores (20) may surround a production wellbore or shaft (26). The precise number of such heating wells provided, as called for in these claims, is deemed an obvious matter of choice or design in carrying out the process of Ljungstrom based

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on, e.g., the overall areal extent of the hydrocarbon formation(s) encountered in exploiting an actual reservoir encountered in the field.

7. Claims 2332, 2336, 2337, 2371, 2375 and 2376 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) as applied to claims 412 and 452 above, and further in view of Tsai et al (4,299,285).

While Ljungstrom does not disclose the presence of hydrogen in the coal heating production effluent, Tsai et al (col. 5, line 52 – col. 6, line 15) clearly discloses that gasification/volatilization products resulting from heating and/or gasifying a coal formation include hydrogen.

Accordingly, it is deemed that the volatilized/gasified coal production effluent produced in the process of Ljungstrom will obviously include a hydrogen component, as taught by Tsai et al, with the precise amount of hydrogen present, as called for in claims 2332, 2336, 2371, and 2375, deemed an obvious expedient or matter of choice to one of ordinary skill in the art to which the invention pertains, based on, e.g., the actual intended use of the production effluent, such as a feed stream to a synthetic natural gas production facility or as process heat gas, as called for in claims.

As per claims 2337 and 2376, it would have further been an obvious expedient or matter of choice to monitor the production effluent of Ljungstrom for hydrogen content, especially since Ljungstrom makes specific reference to controlling the process based on, inter alia, “the products desired” (col. 2, lines 42-44).



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8. Claims 2332, 2336, 2337, 2339, 2340, 2371, 2375, 2376, 2378, 2379 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) as applied to claims 412 and 452 above, and further in view of Justheim (3,766,982).

Justheim'982 injects hydrogen into the heated coal formation to hydrogenate the volatilized/pyrolyzed hydrocarbons evolved; and the hydrogen provided may further be obtained from production fluids obtained from the coal formation (col. 3, lines 1-9).

Accordingly, it would have been obvious to one of ordinary skill in the art to which the invention pertains, to similarly inject hydrogen into the heated coal formation in the process of Ljungstrom, e.g., in the vicinity of the recovery wellbores, and provide the hydrogen from the production effluent, as taught by Justheim, in order to effect a partial hydroconversion/hydrotreating of the volatilized, pyrolyzed and/or gasified hydrocarbons prior to production in order to render the production effluent more suitable for further refining or above-ground processing/conversion, as called for in claims 2339, 2340, 2378 and 2379.

As per claims 2332, 2336, 2371 and 2375, in carrying out the injection of hydrogen into the coal formation to effect hydrogenation of the volatilized/pyrolyzed hydrocarbons evolved, in the modified process of Ljungstrom, the production fluids actually produced will necessarily or obviously include a partial pressure of hydrogen, with the precise amount thereof deemed an obvious matter of choice or design, based on, e.g., the particular coal formation encountered.

As per claims 2337 and 2376, insofar as Justheim strives to control the amount of hydrogen present throughout the process to minimize "danger of accidental explosions", it would have been an obvious expedient or matter of choice to monitor the partial pressure of hydrogen at

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the production well(s) using conventional or commercially-available monitoring means, in carrying out the overall process of Ljungstrom, as modified by Justheim.

9. Claims 2341 and 2380 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) in view of Justheim (3,766,982) as applied to claims 2339 and 2378 above, and further in view of Hoekstra et al (4,353,418) or Garrett (3,661,423).

It would have been obvious to one of ordinary skill in the art to which the invention pertains to further hydrogenate the partially-hydrogenated hydrocarbons produced from the heating process of Ljungstrom, as modified by Justheim'982, with hydrogen circulated or produced by the heating process of Justheim, as taught by Hoekstra et al (note the Abstract and figure) or Garrett (col. 4, lines 50-54), in order to improve the overall quality or advance the refining/processing of the volatilized, pyrolyzed and/or gasified hydrocarbon fluids produced by the process of Ljungstrom, as modified by Justheim'982, by fully or completing hydroconverting/hydrogenating refinement process.

10. Claims 2346, 2347, 2384 and 2385 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) as applied to claim 2308 and 2348 above, and further in view of Salomonsson (2,914,309) or Camacho et al (4,067,390).

It would have been obvious to one of ordinary skill in the art to which the invention pertains to carry out the multiple well heating embodiment of Ljungstrom (Figures 2-5 and 9) by providing or laying out the wells in a triangle, and/or repeating triangle pattern, as disclosed by Salomonsson (note Figure 3 and col. 3, lines 5-34) or Camacho et al (note Figure 8) in order to enhance the overall heating/pyrolysis effected by optimizing well location.

11. It is noted that claims 2315, 2354 and 5164 have been rejected only on obviousness double patenting, as set forth above.

12. Applicant's arguments with respect to the pending claims have been considered but are moot in view of the new ground(s) of rejection.

It is noted with regard to the obviousness double patenting rejection that MPEP Section 804.02 (page 88-30) clearly sets forth that "if an appropriate double patenting rejection of the non-statutory type is made in two or more pending applications, an appropriate terminal disclaimer must be filed in each application". Thus, a terminal disclaimer is required in both this application and the "sister" application, S.N. 09/841,293 to hydrocarbon formation treatment.

The primary reference(s) applied against the claims in the previous Office action have been withdrawn in view of the amendments to the claims and/or applicant's arguments in support thereof. Overall, it is noted that Terry (3,924,680) does not appear to comprise or include a step of "controlling the heat to yield ... condensable hydrocarbons", as called for in claims 2309, 2348 and 5160


13. This action has not been made final, the amendment to the claims notwithstanding, because the reference to Ljungstrom(2,923,535) could have been applied in the previous Office action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Suchfield whose telephone number is 703-308-2152. The examiner can normally be reached on M-F (6:30 - 3:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bagnell can be reached on 703-308-2151. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-7687 for regular communications and 703-305-7687 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

  
George Suchfield  
Primary Examiner  
Art Unit 3672

gs  
November 21, 2002